



## IMPROVING RISK MANAGEMENT FOR INTERNATIONAL CONSTRUCTION PROJECTS: AN AI-EMPOWERED APPROACH TO PROACTIVE DECISION MAKING

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### ABSTRACT

The implementation process of International Construction Projects (ICP) involves a large number of activities and stakeholders, facing not only the typical risks of domestic construction projects but also the complex and diverse risks peculiar to international transactions. Under the complexities from both the internal and external ICP environments, ICP risks are highly interdependent and connected via various cause-effect relationships. Risk propagation effects can easily occur throughout an ICP lifecycle and further amplify the negative influence of risks on realising project objectives. This work aims to develop an artificial intelligence (AI)-empowered approach for proactive decision making in the ICP risk assessment and treatment processes considering complex risk interdependencies. To achieve the research objective, a risk interdependency network (RIN) is first constructed to represent the identified ICP risks and their cause-effect relationships. Then, we develop a simulation-based RIN model for risk assessment by capturing the stochastic behaviour of risk occurrence and including the effects of dynamic risk propagation in an ICP RIN. Several risk indicators from different perspectives are proposed to evaluate the importance of individual risks and the project-level risk. Based on the risk assessment results obtained, appropriate risk treatment actions can be formulated to mitigate critical project risks and risk propagation effects. Moreover, through a scenario analysis, the performances of alternative sets of risk treatment actions are examined using the simulation-based RIN model. An illustrative example is also provided to demonstrate the application and efficacy of the proposed approach for proactive decision making in the ICP risk management. The findings from this study enables ICP practitioners to gain a better understanding of project risk profiles in an entire ICP lifecycle and to deal with risks more proactively and effectively.

Keywords: Risk assessment, Risk interdependency network, Proactive decision making, International Construction Projects, Risk management

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